

NAME:

DATE:

## p1020: graded take-home open-note practice exam (version 210)

### Question 1

Let  $f$  represent a function. If  $f[7] = 5$ , then there exists a knowable solution to the equation below.

$$y = 9 \cdot \left( f \left[ \frac{x-10}{4} \right] - 2 \right)$$

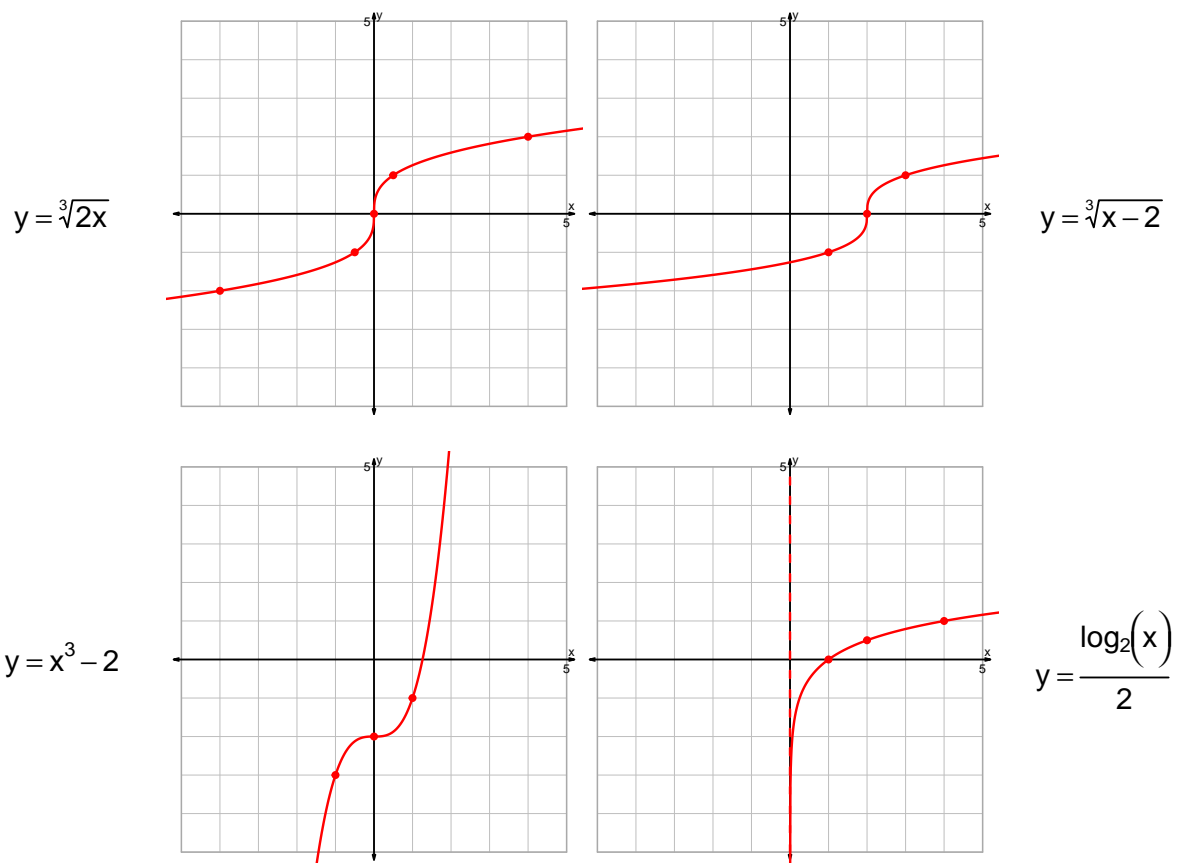
Find the solution.

$$x = 38$$

$$y = 27$$

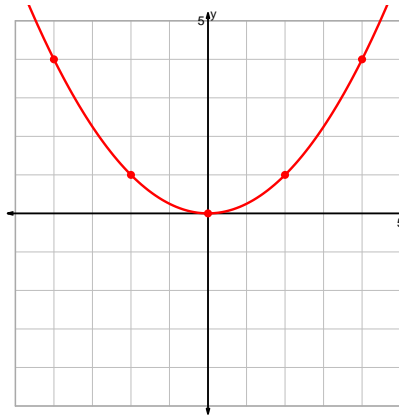
### Question 2

Graph the equations accurately. For each integer-integer point on the parent, indicate the corresponding point precisely. Also, with dashed lines, indicate any asymptotes.

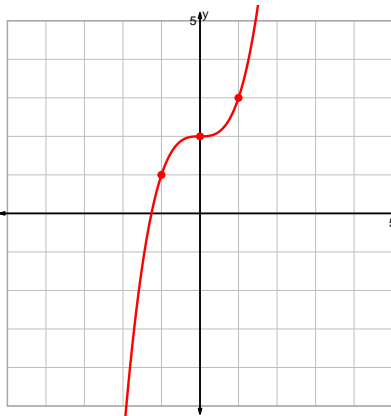


Question 2 continued...

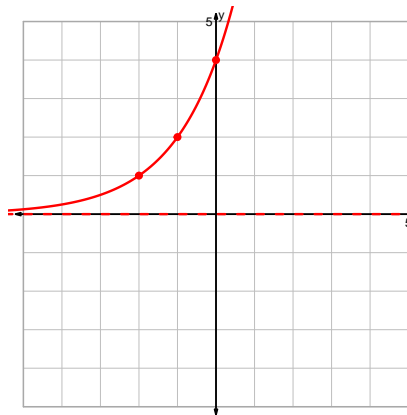
$$y = \left(\frac{x}{2}\right)^2$$



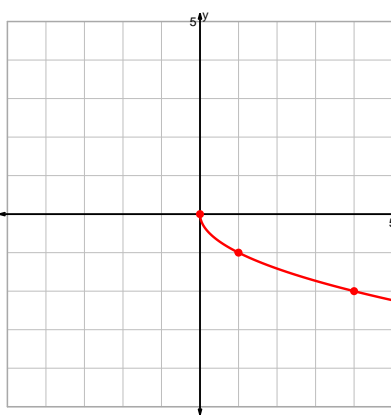
$$y = x^3 + 2$$



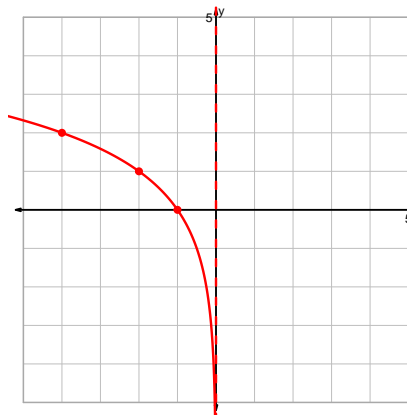
$$y = 2^{x+2}$$



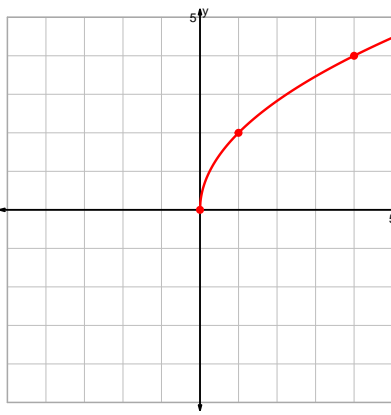
$$y = -\sqrt{x}$$



$$y = \log_2(-x)$$

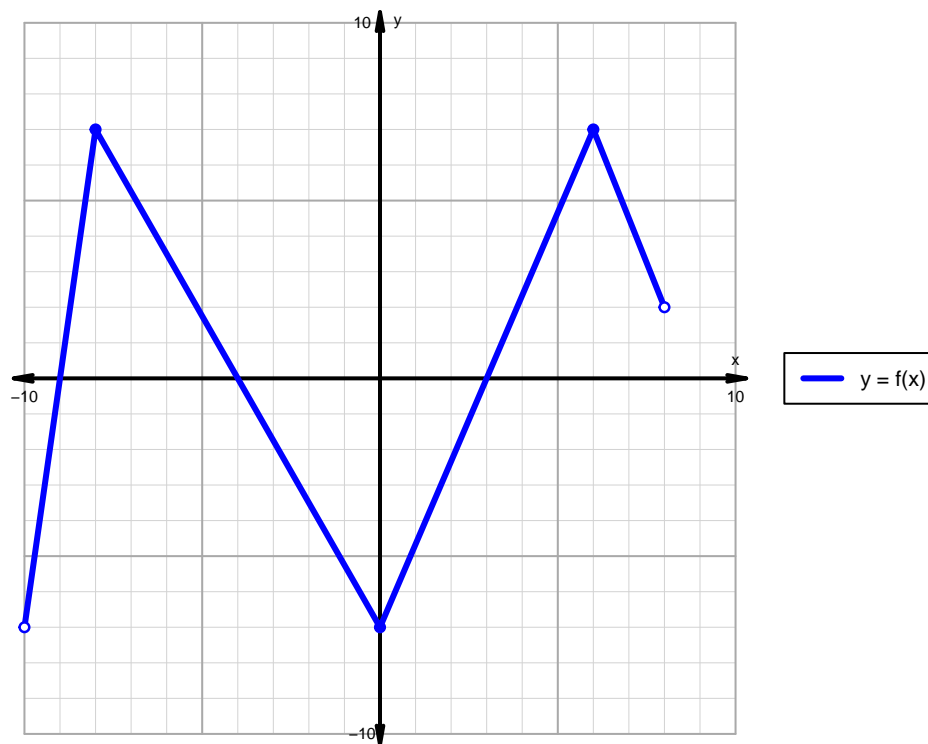


$$y = 2 \cdot \sqrt{x}$$



### Question 3

A function is graphed below.



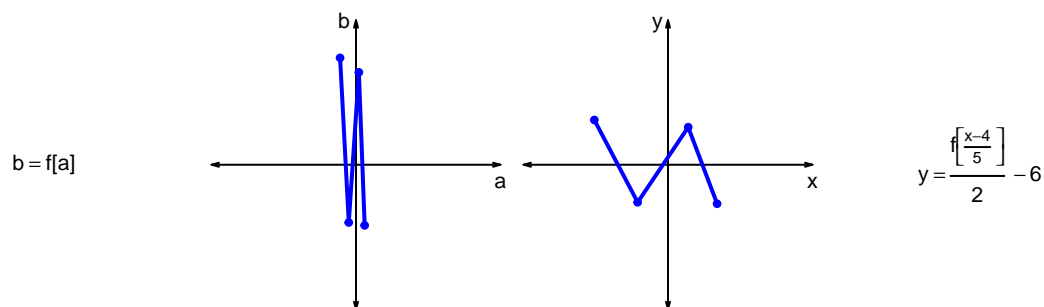
Indicate the following intervals using interval notation.

Feature	Where
Positive	$(-9, -4) \cup (3, 8)$
Negative	$(-10, -9) \cup (-4, 3)$
Increasing	$(-10, -8) \cup (0, 6)$
Decreasing	$(-8, 0) \cup (6, 8)$
Domain	$(-10, 8)$
Range	$(-7, 7)$

#### Question 4

Let  $f$  represent a function. The curves  $b = f[a]$  and  $y = \frac{f\left[\frac{x-4}{5}\right]}{2} - 6$  are represented below in a table and on graphs.

a	b	x	y
-11	74	-51	31
-5	-40	-21	-26
2	64	14	26
6	-42	34	-27



- a. Write formulas for calculating  $x$  from  $a$  and calculating  $y$  from  $b$ . (Or, write the coordinate transformation formula.)

$$x = 5a + 4$$

$$y = \frac{b}{2} - 6$$

Or, you can write the formulas as a coordinate transformation:

$$(a, b) \rightarrow \left( 5a + 4, \frac{b}{2} - 6 \right)$$

- b. What geometric transformations (using words like translation, stretch, and shrink), and in what order, would transform the first curve  $y = f[x]$  into the second curve  $y = \frac{f\left[\frac{x-4}{5}\right]}{2} - 6$ ?

1. Horizontal stretch by factor 5.
2. Translate right by distance 4.
3. Vertical shrink by factor 2.
4. Translate down by distance 6.

Or, technically, the vertical transformations could come first.

1. Vertical shrink by factor 2.
2. Translate down by distance 6.
3. Horizontal stretch by factor 5.
4. Translate right by distance 4.

### Question 5

A parent square-root function is transformed in the following ways:

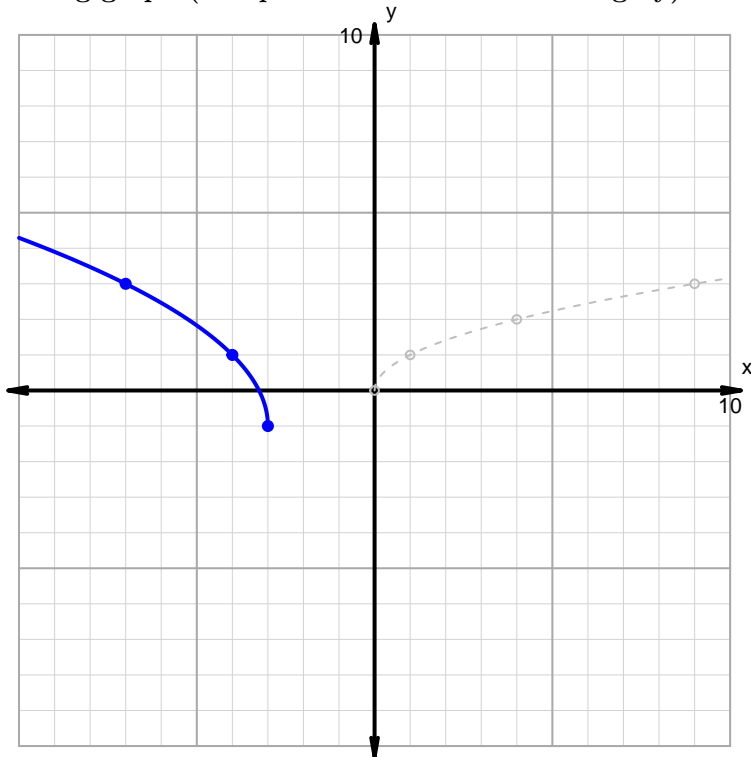
#### Horizontal transformations

1. Horizontal reflection over  $y$  axis.
2. Translate left by distance 3.

#### Vertical transformations

1. Vertical stretch by factor 2.
2. Translate down by distance 1.

Resulting graph (and parent function in dashed grey):



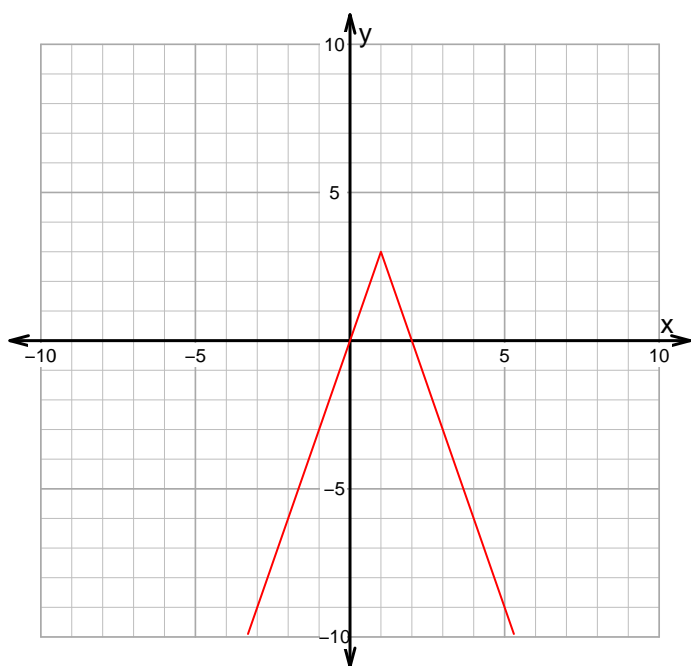
- What is the equation for the curve shown above?

$$y = 2 \cdot \sqrt{-(x + 3)} - 1$$

### Question 6

Make an accurate graph, and describe locations of features.

$$y = -3 \cdot |x - 1| + 3$$



Feature	Where
Domain	$(-\infty, \infty)$
Range	$(-\infty, 3]$
Positive	$(0, 2)$
Negative	$(-\infty, 0) \cup (2, \infty)$
Increasing	$(-\infty, 1)$
Decreasing	$(1, \infty)$